

CLAIMS

What is claimed is:

1. A method for converting from a source color space to a target color space, said source color space resulting from a combination of N primary color points and said target color space resulting from combination of a N+1 or more primary color points in said target color space, wherein N is an integer, the method comprising:

for the target color space, defining a set of at least N+1 primaries in which color points will be rendered as a combination of said primaries;

defining a color point in the interior of said target color space;

dividing said target color space into a set of regions that are bounded by at least three primaries, said one of at least three primaries comprising said interior color point;

calculating solution matrices for each said region;

for any given color point in said source color space, calculating which said region the color point lies in and using the calculated region to select one of said solution matrices for rendering said source color point with said target primaries.

2. The method of Claim 1 wherein N is 3.

3. The method of Claim 1 wherein said interior color point is the white point of the target color space.

4. The method of Claim 1 wherein said interior color point is an off-white color point of the target color space.

5. The method of Claim 1 wherein said regions are substantially triangles.

6. The method of Claim 1 wherein the step of calculating solution matrices further comprises calculating a matrix that converts between an intermediate color space and the destination color space for each said region bounded by said at least three primaries.

7. The method of Claim 6 wherein the intermediate color space is CIE XYZ space.

8. The method of Claim 6 wherein the intermediate color space is the source color space.

9. The method of Claim 1 further comprising determining which region said color point resides.

10. The method of Claim 9 wherein the step of determining which region said color point resides further comprises:

determining the hue angle of said color point; and

determining from said hue angle which region said color point resides.

11. An image processing system for converting from a source color space to a target color space, said source color space resulting from a combination of N primary color points and said target color space resulting from combination of a N+1 or more primary color points in said target color space, wherein N is an integer, comprising:

a display for displaying image data in at least one of the source color space and target color space; and

processing circuitry to define a set of at least N+1 primaries in which color points will be rendered as a combination of said primaries for the target color space, to define a color point in the interior of said target color space, to divide said target color space into a set of regions that are bounded by at least three primaries, said one of at least three primaries comprising said interior color point, to calculate solution matrices for each said region, to calculate which said

region each source color point lies in and using the calculated region to select one of said solution matrices for rendering said source color point with said target primaries for any given color point in said source color space.

12. The image processing system of Claim 11 wherein N is 3.

13. The image processing system of Claim 11 wherein said interior color point is the white point of the target color space.

14. The image processing system of Claim 11 wherein said interior color point is an off-white color point of the target color space.

15. The image processing system method of Claim 11 wherein said regions are substantially triangles.

16. The image processing system of Claim 11 wherein the processing circuitry is to choose a matrix to convert between an intermediate color space and said region bounded by said at least three primaries.

17. The image processing system of Claim 16 wherein the intermediate color space is CIE XYZ space.

18. The image processing system of Claim 16 wherein the intermediate color space is the source color space.

19. The image processing system of Claim 11 wherein the processing circuitry is to determine which region said color point resides.

20. The image processing system of Claim 19 wherein the processing circuitry is to determine the hue angle of said color point and to determine from said hue angle which region said color point resides.

21. A system for converting from a source color space to a target color space, wherein said source color space comprises N primary color points and said target color space comprises at least N+1 primary color points, said system comprising:

input means for accepting source image data color points;

a hue angle calculator to calculate hue angles for the source image data color points;

a gamut converter for optionally fitting the gamut of the source color space to said target color space using the calculated hue angles;

a multi-primary converter for image data values from the N-primary source color space into image data values for the at least N+1 primary target space.

22. A method for efficiently calculating multiprimary conversion matrices, the steps of said method comprising:

calculating a plurality of conversion matrices, wherein each said conversion matrix converts source image data from its chromaticity triangle into a image point in a target color space;

compressing said conversion matrices into smaller dimensioned matrices, wherein said smaller dimensioned matrices may convert source image data from its chromaticity triangle into a image point in a target color space;

performing matrix multiplies with said smaller dimensioned matrices on said source image data; and

multiplexing the results of said multiplies to create multiprimary values.

23. The method of Claim 22 wherein said conversion matrices are 3xN dimensions wherein N is the number of target multiprimaries.

24. The method of Claim 22 wherein said smaller dimensioned matrices are 3x3 matrices.
25. The method of Claim 22 wherein the step of compressing said conversion matrices further comprises removing duplicate rows of said conversion matrices.
26. A processing system for efficiently calculating multiprimary conversion matrices, comprising:
- means for calculating a plurality of conversion matrices, wherein each said conversion matrix converts source image data from its chromaticity triangle into a image point in a target color space;
 - means for compressing said conversion matrices into smaller dimensioned matrices, wherein said smaller dimensioned matrices may convert source image data from its chromaticity triangle into a image point in a target color space;
 - means for performing matrix multiplies with said smaller dimensioned matrices on said source image data; and
 - means for multiplexing the results of said multiplies to create multiprimary values.
27. The processing system of Claim 26 wherein said conversion matrices are 3xN dimensions wherein N is the number of target multiprimaries.
28. The processing system of Claim 26 wherein said smaller dimensioned matrices are 3x3 matrices.
29. The processing system of Claim 26 further comprising means for removing duplicate rows of said conversion matrices.